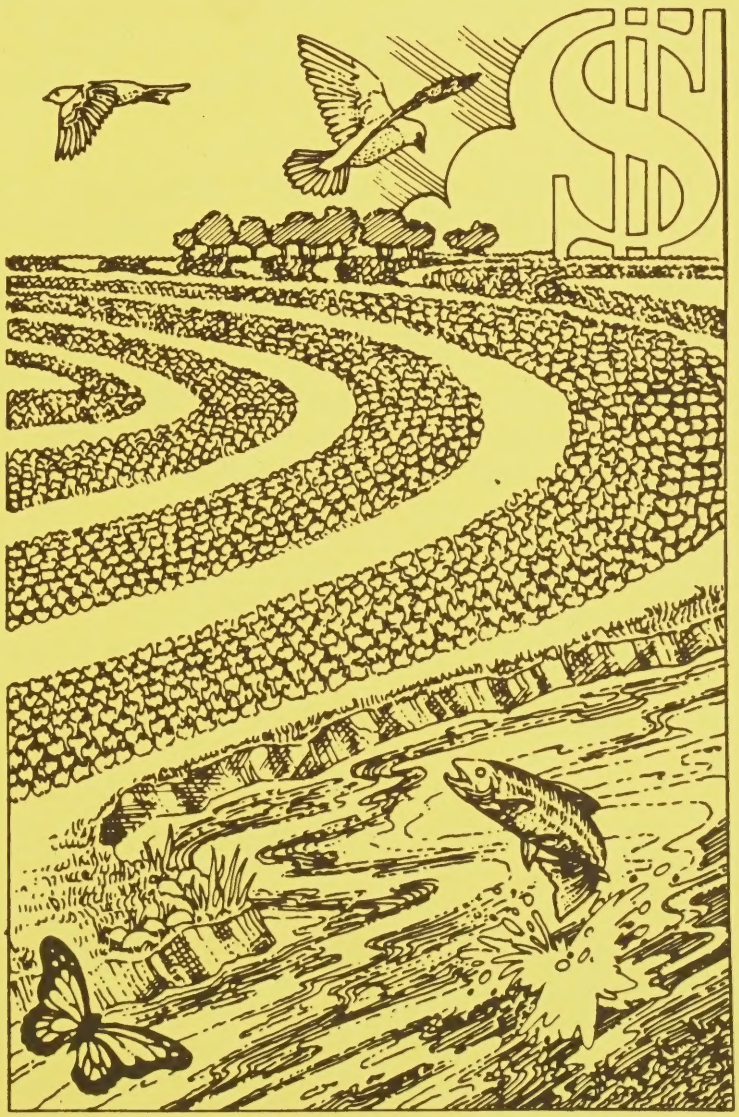
MISSOURI

North-Central Region Projects Supported by Sustainable Agriculture Research and Education Program



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from project reports

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Overview of Missouri Projects

Congress has provided strong and growing support for the Sustainable Agriculture Research and Education grants program, also known as LISA (Low-Input Sustainable Agriculture). Administered by Cooperative State Research Service (CSRS), with the Cooperative Extension Service as a full partner, this program is forging partnerships between farmers, scientists, educators, agribusiness, non-profit organizations, and government -- a partnership that is beginning to promote better stewardship of the Nation's natural resource base. The program has supported 112 new projects since its inception in 1988; perhaps two dozen more will be funded by June.

Projects funded are typically carried out by teams of farmers, university research and education staff, government agencies, non-profit organizations, and private enterprise. Top priority is given to whole-farm integrated systems projects, usually including on-farm research and demonstrations. These projects are providing scientific documentation of low-input sustainable farming practices and systems, in comparison with conventional or chemical-intensive agriculture.

Farmer involvement is one of the strengths of this program. There has been active involvement in the administration of the North Central Region LISA program since its inception. Five producers from the region have served on the Administrative Council which develops policy and distributes funds. Six producers have also served on the Technical Committee which evaluates and recommends project proposals for funding.

Nationwide, 1,860 farmers have participated in projects during the first three years. When farmers participate in the planning and execution of a project, two important things happen. Concerns of farmers are foremost in the design of the project. And scientists get directly exposed to innovative ideas developed or tried by farmers. These ideas often become an integral part of scientific studies. The result is both better science and a more widespread adoption of more sustainable farming methods that are economically viable, socially acceptable, and environmentally sound, assuring cleaner water and a plentiful supply of safe food for generations to come.

The coordinators of Missouri projects were asked about participating farmers. Here is what they reported:

- A total of 10 Missouri farmers have participated in LISA research and education projects; all 10 are helping with the evaluation of projects;

- 5 are reported to have helped generate ideas for these projects.

Projects Funded 1988-1990

Five projects funded by this program that include Missouri scientists, farmers, or educators in major roles are described here. These projects received a total of $366,850, and provided $423,519 matching funds. In most of the projects, a scientist serves as the Project Coordinator. In others, a farmer or other local area residents are contributing to a multi-state project headquartered in another state.

Low-Input Agriculture and Cover Crop Workshop for Extension and Research Personnel from Nebraska, Iowa, Kansas and Missouri (LNC88-5)

Summary

The workshop provided participants with latest information on various agronomically related subject matter relevant to low-input agriculture. Participants prepared teaching materials appropriate for use in training other scientists and Extension field staff in their respective states. Subsequent training sessions and educational programs for agri-organization leaders and producers followed. As a specific 2-day part of the workshop, researchers from the four states discussed current activities in the area of cover crops and developed research plans for future efforts. A joint session provided an overview of reported cover crop research and general known information outside the region.

Project Coordinator: Zane R. Helsel, **University of Missouri**

Major Participants: **University of Nebraska**: R. Ferguson, R. Selley, C. Francis; **Kansas State University**: D. Whitney; **Iowa State University**: R. Voss

Project Duration: 1 Year

Total Funding: LISA Funds: $16,500; Matching Funds: $4,799

Low-Input Database and Information System (LNC88-7)

Summary

This project developed a north central regional low-input agriculture database/information system. The database will become a part of a proposed national information delivery network. Representatives from the 12 north central states developed plans to organize and produce an interactive computerized database and information retrieval system for low-input agriculture. The system allows for the input and retrieval of both published and unpublished (reputable information) research and field trial data. The information network will also include references to video tapes, slide sets, calendar of events, etc.

Project Coordinator: V. Shade, **University of Missouri**

Major Participants: Zane R. Helsel, **University of Missouri**; C. Francis, **University of Nebraska**

Project Duration: 1 Year

Total Funding: LISA Funds: $5,000; Matching Funds: $5,000

Evaluation of Integrated Low-Input Crop/Livestock Production Systems (LNC88-13)

Summary

Diversifying the biology and the economy of Northern Plains agriculture could be done by discovering new ways of integrating and re-introducing livestock into the agroecosystem. While the inclusion of ruminant animals in the production system may not be essential for the development of a more sustainable agriculture, several factors suggest that integrated crop-livestock production systems would be beneficial. Cereal grain straws are abundant in the Northern Plains farming areas. Legume hay crops are often included in low-input cropping systems for nitrogen fixation and conservation. Legume hay, screenings and weather-damaged grain crops complement crop residues in ruminant diets. Integrated enterprises not only maximize use and value of crop products as livestock feed, but also insure employment throughout the year. Economic viability, however, is necessary to continue operation regardless of production methods. Adding livestock to a crop farm will require additional management of manure and control of insects, particularly flies that feed on livestock and reproduce in manure. Increasing horn fly resistance to insecticides, EPA bans, and consumer concerns suggest a need for study of non-chemical approaches for fly control.

Project Coordinator: J. C. Gardner, **North Dakota State University, Carrington Research Extension Center**

Major Participants: **North Dakota State University at Carrington:** B. G. Schatz, V. L. Anderson, **NDSU Main Research Station;** S. Boyles, D. Watt, H. Meyer, D. Kopp, **NDSU Hettinger Research and Extension Center,** T. Faller; **University of Illinois:** R. A. Weinzieri; **University of Missouri:** R. D. Hall

Project Duration: 1 Year continuation funding

Total Funding: LISA Funds: $132,700; Matching Funds: $93,000 plus in-kind contributions

Low-Input Beef Cattle Systems of Production (LNC88-19)

Summary

The areas of southern Iowa, northern Missouri and eastern Nebraska are similar in erodability of the soils, the mix of row crops and pastures on most farms and the production of beef as cow/calf or yearlings. Because of their unique ability to utilize forages, beef cattle fit into such a farming system. Beef producers can become more competitive by increasing the economical use of forages and by reducing input costs. Dramatic savings could be realized without greatly reduced output by:

- maximizing use of forage,
- minimizing use of grains,
- maximizing grazing,
- minimizing harvesting, and
- minimizing purchased supplemental feed.

Year round beef production systems are being tested in Nebraska, Iowa and Missouri. Research at the University of Nebraska has shown that grain feeding can be cut in half by using an extensive, low input, high forage system of grazing and finishing cattle. The grain needed per lb of gain was reduced from 5.3 to 2.4 lb. Better yet, the cost of weight gain was $.06/lb lower on the forage system.

The "summer slump," due to poor growth when cattle are grazing endophyte infested fescue, was solved by investigators at the University of Missouri by grazing sorghum sudan, warm-season grass or endophyte-free fescue. By interseeding sorghum sudan into endophyte infected tall fescue sod, the reappearance of tall fescue in the fall was minimal. This grazing system provides the producer with an opportunity to kill an infected stand without sacrificing the opportunity to graze animals on these pastures during the summer. The renovated pastures can then be seeded to an endophyte free variety of tall fescue.

In studies conducted at Iowa State University, rotational grazing of an alfalfa-grass pasture resulted in greater total calf production while not affecting the growth of individual calves. It also led to an increase in the percentage of legume in a pasture, possibly due to reduced competition with grasses and the rest periods for the legumes which occur in rotational grazing. Cow gains on corn stalks were related to stocking rate and gains were improved by strip grazing. In general, better management gave better cattle performance and greater returns.

The results from this research were presented at a national symposium in April 1990, co-sponsored by LISA and the National Academy of Sciences, and at a three-state symposium in June, 1990. A variety of articles and newsletters also carried the results. Future studies will focus on:

- improving grazing gains by including summer annuals, alfalfa, supplementation and extending the grazing season,
- determining whether summer annuals can be no-tilled into tall fescue sod,
- comparing winter grazing of stockpiled tall fescue pastures with drylot feeding of hay on subsequent gains by backgrounding steers to reduce the need for purchasing winter feed, and
- further comparison of continuous, rotational, and strip-grazing of pastures to determine the economic, energetic and nutrient inputs into each of the systems.

Project Coordinator: Terry Klopfenstein, **University of Nebraska**

Major Participants: **University of Nebraska**: J. Gosey, R. Rasby, B. Anderson, R. Stock, G. Pfeiffer; **University of Missouri**: J. Paterson, J. Whittier, M. Kerley,

Iowa State University: J. Russell, A. Trenkle, D. Loy, D. Stobehn, W. Wedin, J. A. Hallam, S. Barnhart

Agricultural Research Service: J. Forwood

Project Duration: 1 Year funding (5 years total 1988-1992)

Total Funding: LISA Funds: $152,500; Matching Funds: $270,011

Utilization of the Allelopathic Properties of Winter Rye as a Method of Weed Control in Soybean Production (LNC88-21)

Summary

A two-year field study was initiated in 1989 by scientists with the Rodale Institute and the University of Wisconsin. Three experiments were done at the University of Wisconsin's Arlington Research Farm, and at seven on-farm sites throughout the Midwest. The purpose of this project was to determine the effectiveness of a cover crop (winter rye) to control weeds in soybean production. Various methods of managing the rye cover crop were examined. A major challenge is to terminate the rye cover crop in a way that will retain its allelopathic weed control power, while avoiding a regrowth or "retillering" of the rye that could tower over the soybeans, greatly reducing their yield.

In the *first experiment,* fall-planted winter rye was killed via three methods (glyphosate, mowing and tillage) and at three different growth stages (tillering, boot, and pollination) Rye that was killed with herbicide (glyphosate) plus mowing adequately controlled weed populations equal to the herbicide treatment checks. Rye killed by chisel plowing did not adequately control weeds at any stage. The exception was that rye killed at the tillering stage with glyphosate exhibited a significant decrease in weed control compared to herbicide checks, perhaps due to the lower quantity of rye biomass.

The *second experiment* conducted at Arlington evaluated rye and oat in combination with a hairy vetch companion crop for weed control in no-till soybean. The oat winter-killed (as expected) and the rye was killed with glyphosate. There was no difference in percent weed control between the narrow row soybean planted into rye and the narrow row or wide row soybean with no cover that received an application of a pre-emergence herbicide. The weed control for all these treatments ranged from 88 to 95% control.

The *third experiment* evaluated four herbicides and cultivation for their ability to control rye which re-tillered after mowing in the boot stage. The objective was to enhance the allelochemical control of annual weeds by allowing additional rye biomass accumulation after planting soybeans in 30" rows. All grass herbicides, applied 14 or 21 days after mowing, adequately (83%) controlled the re-tillering rye regardless of rate. Cultivating two times controlled the rye at levels comparable to the grass herbicide treatments. A single cultivation and glyphosate, applied prior to mowing, had slightly higher weed control (98%), than all other treatments except the glyphosate-only treatment. Weed control was enhanced when herbicides were applied later in the season.

Description of Participating Missouri Farmer

Ron and Donna Harmon (Salisbury, MO). This is a 60-sow, farrow to finish, hog farm in northeastern Missouri. They grow 800 acres of corn, soybean, oat, alfalfa, and wheat. The tilled rye stubble proved inadequate in controlling both grass and broadleaf weeds.

Project Coordinator:	James Tjepkema, **Rodale Institute**
Major Participants:	University of Wisconsin: J. Doll, T. Bauer
Farmers:	**Iowa:** R. Thompson; **Michigan:** R. Fogg; **Missouri:** R. Harmon; **Illinois:** T. Holsapple; **Ohio:** R. Bennett; **Wisconsin:** J. Bauer; **Nebraska:** G. Zicafoose
Project Duration:	2 Years
Total Funding:	LISA Funds: $60,150; Matching Funds: $50.709